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Carl A. Reiser

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EXAMINER

ONEILL, KARIE AMBER

ART UNIT

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1745

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DELIVERY MODE

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/765,737	Applicant(s) REISER, CARL A.	
	Examiner Karie O'Neill	Art Unit 1745	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 March 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-5 is/are pending in the application.
- 4a) Of the above claim(s) 4 and 5 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

1. The Applicant's arguments filed on March 12, 2007, were received. None of the claims were amended. Claims 4-5 have been added.

2. The text of those sections of Title 35, U.S.C. code not included in this action can be found in the prior Office Action issued on December 12, 2006.

Election/Restrictions

3. Newly submitted claim 4 is directed to an invention that is independent or distinct from the invention originally claimed for the following reasons: The subject matter of the Claims 4 and 2 are related as process and apparatus for its practice. The inventions are distinct if it can be shown that either: (1) the process as claimed can be practiced by another and materially different apparatus or by hand, or (2) the apparatus as claimed can be used to practice another and materially different process. (MPEP § 806.05(e)). In this case the apparatus of Claim 2 can be used in either process of Claims 1 and 4, respectively.

Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claim 4 is withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

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4. Newly submitted claim 4 is directed to an invention that is independent or distinct from the invention originally claimed for the following reasons: The subject matter of the aforementioned claim is "a method of reducing performance degradation due to hydrogen starvation of a fuel cell power plant providing electrical power to a load, comprising: disconnecting the load from the fuel cell stack in the event that there is no flow of gas from said flow fields toward ambient being sensed", which is a distinct species from is "a method of reducing performance degradation due to hydrogen starvation of a fuel cell power plant providing electrical power to a load, comprising: disconnecting the load from the fuel cell stack in the event that there is no flow of gas from said flow fields toward ambient", as recited in the original claim.

Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claim 4 is withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

5. Newly submitted claim 5 is directed to an invention that is independent or distinct from the invention originally claimed for the following reasons: The subject matter of the Claims 1 and 5 are related as process and apparatus for its practice. The inventions are distinct if it can be shown that either: (1) the process as claimed can be practiced by another and materially different apparatus or by hand, or (2) the apparatus as claimed can be used to practice another and materially different process. (MPEP § 806.05(e)).

In this case the process of Claim 1 can be used with either apparatus of Claims 2 and 5, respectively.

Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claim 5 is withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

4. Newly submitted claim 5 is directed to an invention that is independent or distinct from the invention originally claimed for the following reasons: The subject matter of the aforementioned claim is "a method of reducing performance degradation due to hydrogen starvation of a fuel cell power plant providing electrical power to a load, comprising: means for disconnecting the load from the fuel cell stack in the event that there is no flow of gas from said flow fields toward ambient being sensed by said means for sensing", which is a distinct species from is "a method of reducing performance degradation due to hydrogen starvation of a fuel cell power plant providing electrical power to a load, comprising: means for disconnecting the load from the fuel cell stack in the event that there is no flow of gas from said flow fields toward ambient", as recited in the original claim.

Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claim 67 is withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

Claim Rejections - 35 USC § 103

5. The rejection of Claims 1-3 under 35 U.S.C. 103(a) as being unpatentable over Woods et al. (US 2004/0137290 A1) in view of Rueegge et al. (US 2002/0055023 A1) and in further view of Skidmore et al (US 2005/0136296 A1) are maintained.

Woods et al. disclose a method and apparatus, in Figure 1, having a fuel cell power plant providing electrical power to a load (paragraph 0015), comprising: a fuel cell power plant (10) with a hydrogen fuel cell (2) having fuel reactant gas flow fields (201, 205); means for providing fuel reactant gas to said flow fields through the reformer (1); and a means for purging at least periodically, at least a small amount of partially depleted fuel reactant gas exiting from said flow fields. The fuel cell (2) typically operates at anode side stoichiometric ratios and periodic purging of contaminants in the anode flow field take place through line (207) by activating a purge valve (208) connected to line (209) to vent air to a safe location (211) (paragraph 0040).

Woods et al. does not disclose a means for sensing the direction of flow of gas between said flow fields and ambient and means for disconnecting the electrical load from the fuel cell stack in the event that there is no flow of gas from said flow fields toward ambient.

Rueegge et al. disclose in Figure 6, a means for sensing the direction of flow of gas between the flow fields and ambient by placing a pressure regulator (4) in the exhaust gas flow (3) at two places (31, 32) which is dependent upon the mass flow of the gases. A diaphragm (30) is also located between the two pressure regulators,

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which is suitable for producing a pressure difference which is dependent on the mass flow being arranged between the two connection points (31, 32). It is well known in the art that a diaphragm is capable of sensing the flow of gases. A valve (8) is connected to the connection points (31, 32) and allows only slight gas flows to pass to ambient (paragraph 0027). Therefore, at the time of the invention it would have been obvious to one of ordinary skill in the art to use a sensing means with the fuel cell of Woods et al., because Rueegge et al. teach using the pressure regulator to control the valve so as to keep the gas flow constant through the flow fields (paragraph 0027).

Woods et al. and Rueegge et al. do not teach a means for disconnecting the electrical load from the fuel cell stack in the event that there is no flow of gas from said flow fields toward ambient.

Skidmore et al. disclose a means for disconnecting the electrical load from the stack in the event there is no flow of gas from flow fields to ambient, by closing the control valves (44) that supply reactant flows to the fuel cell stack and then electrically disconnecting the load (50) from the stack (20) (see Figure 1 and paragraph 0034). For purposes of disconnecting the load (50) from the stack (20) the fuel cell system (10) may include a switch (29) that is coupled in series between the fuel cell stack (20) and the load (50) so that by opening the switch the fuel cell system may disconnect the stack from the load (paragraph 0035). Therefore, at the time of the invention it would have been obvious to one of ordinary skill in the art to disconnect the fuel cell of Woods et al. and Rueegge et al. from the load, because Skidmore et al. teach disconnecting

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the fuel cell from the load when the stack exhibits unstable behavior and produces a relatively low level of power for the load (paragraph 0032).

With regard to Claim 3, Rueegge et al. disclose a flap or aperture diaphragm (30), located in the exhaust gas flow line (3) between two connection points of the pressure regulator (4), suitable for producing a pressure difference which is dependent on the mass flow of gases in the exhaust gas line (paragraph 0027). The pressure built up by the aperture diaphragm influences the let off valve (9) by means of the pressure difference which acts on the pressure regulator located next to the aperture diaphragm (paragraph 0028). It is well known in the art that a diaphragm is capable of sensing the flow of gases. Therefore, at the time of the invention it would have been obvious to one of ordinary skill in the art to use a flap disposed with the exhaust line with the fuel cell of Woods et al, because Rueegge et al. teach with the aperture diaphragm the ratio of the two gas flows (air and fuel) can be changed and when required readjusted (paragraph 0020).

6. The rejection of Claims 1 and 2 under 35 U.S.C. 103(a) as being unpatentable over Woods et al. (US 2004/0137290 A1) in view of Kawasumi et al. (US 2002/0001741 A1) and in further view of Skidmore et al (US 2005/0136296 A1) are maintained. The rejection is repeated below for convenience.

Woods et al. disclose a method and apparatus, in Figure 1, having a fuel cell power plant providing electrical power to a load (paragraph 0015), comprising: a fuel cell power plant (10) with a hydrogen fuel cell (2) having fuel reactant gas flow fields

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(201, 205); means for providing fuel reactant gas to said flow fields through the reformer (1); and a means for purging at least periodically, at least a small amount of partially depleted fuel reactant gas exiting from said flow fields. The fuel cell (2) typically operates at anode side stoichiometric ratios and periodic purging of contaminants in the anode flow field take place through line (207) by activating a purge valve (208) connected to line (209) to vent air to a safe location (211) (paragraph 0040).

Woods et al. does not disclose a means for sensing the direction of flow of gas between said flow fields and ambient and means for disconnecting the electrical load from the fuel cell stack in the event that there is no flow of gas from said flow fields toward ambient.

Kawasumi et al. disclose in Figure 1, pressure sensors (24, 25) for measuring the pressure of respective exhaust systems of the air electrode and the fuel electrode in the fuel cell (15) (paragraph 0032). Therefore, at the time of the invention it would have been obvious to one of ordinary skill in the art to use a sensing means with the fuel cell of Woods et al., because Kawasumi et al. teach if the operation pressure changes and the flow rate of the gas changes the fuel cell system will run less efficiently, making it important to sense the flow of gases between flow fields and ambient (paragraph 0033).

Woods et al. and Kawasumi et al. do not teach a means for disconnecting the electrical load from the fuel cell stack in the event that there is no flow of gas from said flow fields toward ambient.

Skidmore et al. disclose a means for disconnecting the electrical load from the stack in the event there is no flow of gas from flow fields to ambient, by closing the

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control valves (44) that supply reactant flows to the fuel cell stack and then electrically disconnecting the load (50) from the stack (20) (see Figure 1 and paragraph 0034). For purposes of disconnecting the load (50) from the stack (20) the fuel cell system (10) may include a switch (29) that is coupled in series between the fuel cell stack (20) and the load (50) so that by opening the switch the fuel cell system may disconnect the stack from the load (paragraph 0035). Therefore, at the time of the invention it would have been obvious to one of ordinary skill in the art to disconnect the fuel cell of Woods et al. and Kawasumi et al. from the load, because Skidmore et al. teach disconnecting the fuel cell from the load when the stack exhibits unstable behavior and produces a relatively low level of power for the load (paragraph 0032).

Response to Arguments

7. The Declaration under 37 CFR 1.132 filed March 12, 2007, is insufficient to overcome the rejection of claims 1-3 based upon the 35 U.S.C. 103(a) combination of references as set forth in the last Office action because:

(a) To be of probative value, any objective evidence should be supported by actual proof. *In re De Blauwe*, 736 F.2d 699, 705,222 USPQ 191, 196 (Fed. Cir. 1984). See MPEP 716.01(c) I.

(b) The declaration, considered to be expert opinion, was inadequate to overcome the rejection based on prior art because there was no factual evidence supporting the statements. *Ex parte Gray*, 10 USPQ2d 1922 (Bd. Pat. App. & Inter. 1989). See MPEP 716.01(c) III.

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8. Applicant's arguments filed March 12, 2007, have been fully considered but they are not persuasive.

Applicant's principal arguments are:

(a) Rueegge does not teach one skilled in the art that flow, and particularly direction of flow, of fuel exhaust should be sensed.

(b) Skidmore does not suggest that disconnecting the fuel cell stack "should be responsive" to the direction of fuel exhaust flow.

(c) Kawasumi discloses a single pressure sensor in the fuel effluent, and that a single pressure sensor will not indicate flow, and particularly not indicate flow direction.

In response to Applicant's arguments, please consider the following comments:

(a) Rueegge et al. disclose placing a pressure regulator (4) in the exhaust gas flow (3) at two places (31, 32) which is dependent upon the mass flow of the gases. Rueegge et al. also teach a flap or aperture diaphragm (30), located in the exhaust gas flow line (3) between two connection points of the pressure regulator (4), suitable for producing a pressure difference which is dependent on the mass flow of gases in the exhaust gas line (paragraph 0027). The pressure built up by the aperture diaphragm influences the let off valve (9) by means of the pressure difference, which acts on the pressure regulator located next to the aperture diaphragm (paragraph 0028). It is well known in the art that a diaphragm is capable of sensing the flow of gases. As evidenced by Stedman (US 3,444,736), a pressure transducer comprises two load sensing diaphragms

with a linearly responsive diaphragm therebetween, in relation to the direction of fluid flow and further comprising movement sensing means coupled to the linearly responsive diaphragm. The Maloney reference further supports the notion that the diaphragm is sensitive to the flow direction of the fluids in the system. Although the Ruegge et al. reference does not distinctly point out that the pressure regulator and diaphragm are specifically for sensing the "direction of flow", Ruegge et al. teach a diaphragm being present in the reference, and it is known in the art that a movement "sensing means" connected to a diaphragm can sense the directional flow of gases present in a system.

(b) The independent claims do not suggest that the absence of fuel flow to ambient "should cause" the fuel cell to be disconnected from the load. It simply discloses disconnecting the load from the stack in the event that there is no flow of gas from the flow fields toward ambient. The Examiner is to give claims their broadest reasonable interpretation in light of the supporting disclosure. *In re Morris*, 127 F.3d 1048, 1054-55, 44 USPQ2d 1023, 1027-1028 (Fed. Cir. 1997).

(c) Kawasumi discloses in paragraph 0032 and Figure 1, pressure sensors for measuring the pressure of respective exhaust systems of the air electrode and fuel electrode in the fuel cell system.

Conclusion

9. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

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A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.


Any inquiry concerning this communication or earlier communications from the examiner should be directed to Karie O'Neill whose telephone number is (571) 272-8614. The examiner can normally be reached on Monday through Friday from 8am to 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

KAO


DAH-WEIYUAN
PRIMARY EXAMINER

Karie O'Neill
Examiner
Art Unit 1745